Power Focus Quick Guide

SAFETY INSTRUCTIONS

When using electric products, basic precautions should be followed:

- ❑ THIS EQUIPMENT MUST BE EARTH GROUNDED.
- ❑ Always disconnect the equipment from the mains, by pulling the plug, before opening it for installation, service etc.
- ❑ Do not use this product near water.

Atlas Copco

SCOPE

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INSTALLATION CHECK LIST

Power Focus is Atlas Copco's latest generation of control and monitoring systems for electrical tools. The fastening system consists of:

– A **Power Focus controller**. Three different hardware units are available. Only the user interface differs between the models.

PF Compact

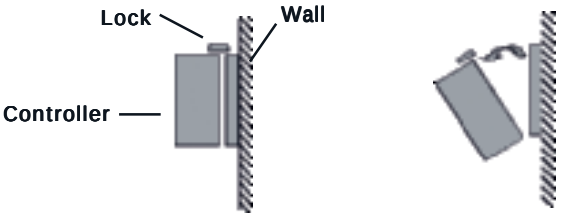
PF Graph

PF Colour

– A **RBU**, Rapid Backup Unit enabling a special level of functionality (Bronze, Silver, Gold and DS).

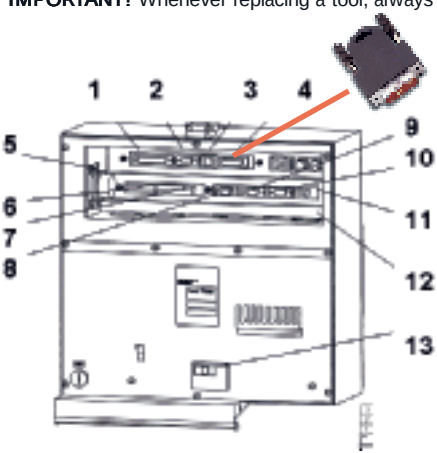
– And of course a **cable** and a **tool**. The Tensor S tool is available in different configurations and torque ranges.

INSTALLATION PROCEDURE



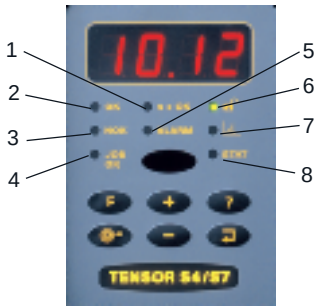
1) Open the lock mechanism.
2) Open the Controller by pulling it.
3) Connect the tool cable, power cable etc. (see picture below)
4) Connect the RBU.
5) Check the GFI (Ground Fault Interruptor) is switched on.
6) Close the Controller and lock it.
7) Connect the power cable to a power supply (115/230 V).
8) Turn the power on.

IMPORTANT! Whenever replacing a tool, always turn the power off.



1. Printer
2. Serial#2 (RS232)
3. Ethernet
4. RBU
5. Tool output
6. Digital input
7. Relays
8. Serial#1 (RS232)
9. I/O-bus
10. I/O-bus
11. Remote start
12. Main power connector
13. GFI, Ground Fault Interruptor

POWER FOCUS 3000/3100 COMPACT DISPLAY



1. n x OK
2. OK
3. NOK
4. JOB OK
5. ALARM
6. PROG CONTROL
7. AUTO SET
8. STAT

1. **n x OK** lights up when the number of approved rundowns corresponds to the number (batch size) programmed into Power Focus.

2. **OK** indicates when the result of the rundown is within the specified limits.

3. **NOK** lights up when the result of the rundown falls outside the specified limits.

4. **JOB OK** light indicates when the result of the Job is complete.

5. **ALARM** lights up when alarm message needs to be acknowledged. Can also flash as service indicator.

6. **Prog. Control.** A steady green shows that keypad is unlocked. If locked, Q-mark and Enter can still be used.

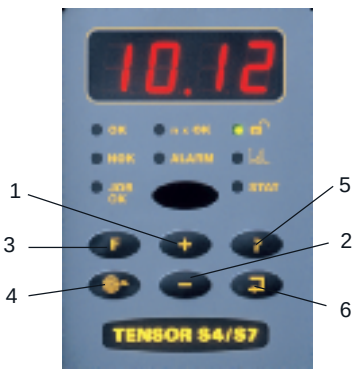
7. **Auto Set** light indicates when the Auto Set programming function is active.

8. **STAT** lights up when the calculated values fall outside statistical control limits.

POWER FOCUS 3000/3100 COMPACT KEYPAD

Question Mark – by pushing this button, you can see:

- Power Focus model alternating with software version (G=Gold, S=Silver, B=Bronze and DS=DS RBU).
- SW version program code alternating with version number.
- Motor type alternating with type number.
- Current Pset alternating with the current Pset ID.
- Current Pset alternating with the current Job ID.



1. Plus Button (+)
2. Minus Button (-)
3. Function Button
4. Auto Set
5. Question Mark
6. Enter

Selecting Pset

1) Press the Function button four times and **F4/Pset** alternates in the display if the Pset Select Source is Keyboard.
2) Press Enter to access the available Psets.

   Browse existing Psets by pressing the +/- keys.
3) Press Enter to select a Pset and exit.

POWER FOCUS 3000/3100 GRAPH FRONT PANEL

The Power Focus Graph offers an LCD with extensive information and a full keypad allowing full programming.

1. Soft KEYS
2. RESULT
3. CHANButton
4. PSet
5. PRINT
6. Question mark KEY
7. CANCEL KEY
8. PROG
9. ARROW KEYS
10. KEYS with numbers and letters
11. CI
12. Enter
13. OK
14. Indicator lights

The **indicator lights** of the Power Focus Graph are similar to the Compact.

Press the **Prog** key to enter programming mode/ programming tree.

Press the **Result** key to exit programming.

The **CHAN** keys are used to select channels in a programmed Cell.

The **Arrow** keys allow you to move the cursor around the programming tree.

The **Number** keys can be used both for numbers and letters by pressing them several times.

The **Print** key allows you to print a report. The printer must be connected to the parallel port on the back of the controller.

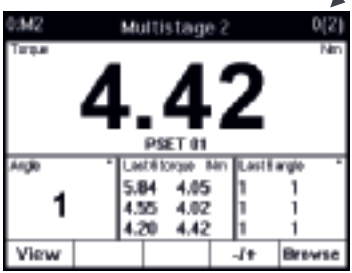
POWER FOCUS 3000/3100 GRAPH DISPLAY

The Power Focus display monitors results and programming. It can be configured to show information from any Power Focus within a Cell. This is only an example, all selection fields can be configured.

Channel number: The number of the monitored channel (tool)

Parameterset / Multistage number which is just active

Number of tightenings and **(batch size)**



View Pull-up menu for switching between:
Last Results
Statistics, Stat Chart
Trace, Job, Sync, All results and Event log

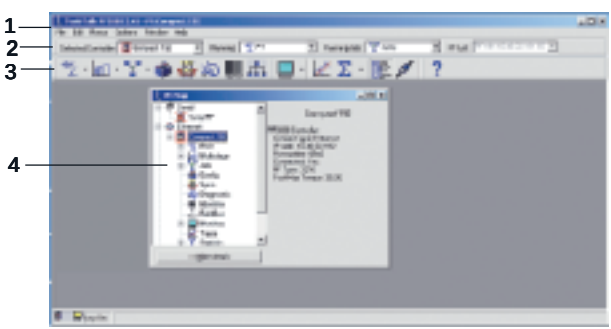
Browse: pushing the soft key allows the user to switch function for the lower right view in runtime

TOOLSTALK POWER FOCUS

ToolsTalk is a very convenient way for programming and monitoring Power Focus from a PC. Users can communicate with the Power Focus via the **serial port (RS232)** as well as over the **Ethernet**.

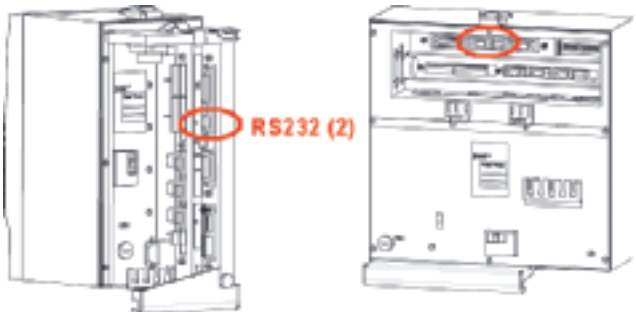
If you are familiar with Microsoft Windows®, you will soon be comfortable with the ToolsTalk interface. The figure below shows:

– the Menu row (1),
– the Selection panel (2),
– the Toolbar (3) and
– the PF Map (4).

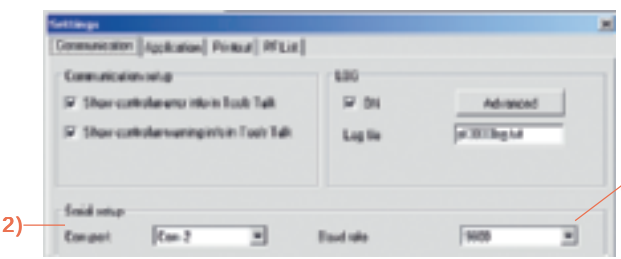


CONNECTING TOOLSTALK SERIALLY

1) There are two serial ports (RS 232). Make sure that you connect your PC to the correct one marked with a (2) and placed on the CC-card.



2) Also make sure that the serial cable is connected to the correct serial com port on the PC. The Com port settings can be set in **Settings.**



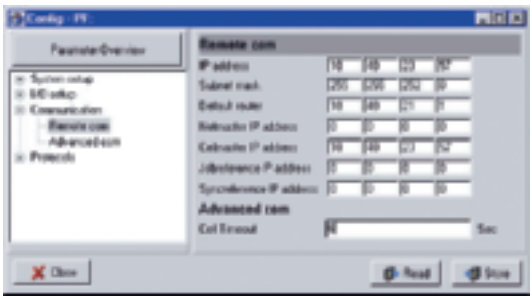
3) It is important to use the same baud rate settings in ToolsTalk and in PF. Default baud rate is set to 9600 bit/s. To change the baudrate on the ToolsTalk side, use **Settings**. And on the Power Focus side, use **Config**.

4) You are now ready to connect with a double click on the connect button, placed on the toolbar.

CONNECTING TOOLSTALK VIA ETHERNET

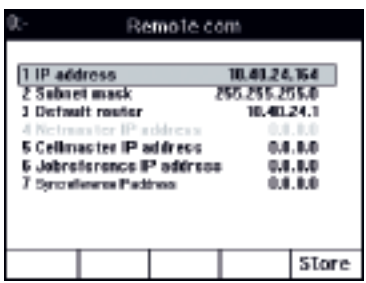
1) Set an **IP address** and **Subnet mask** to the Power Focus you wish to connect to.

   With the **PF Compact**, connect serially ToolsTalk to the controller and go under Config – Communication:



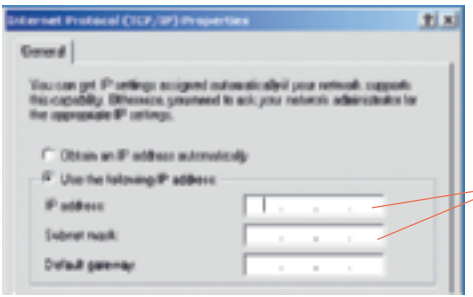
– Set the IP address of the connected Power Focus to a unique number within the network.
– Set the Subnet mask according to network partitioning.
– Store and Restart the Power Focus.

With the **PF Graph**, you can also use ToolsTalk serially or the Keypad in Prog – Config – Remote Communication.



CONNECTING TOOLSTALK VIA ETHERNET

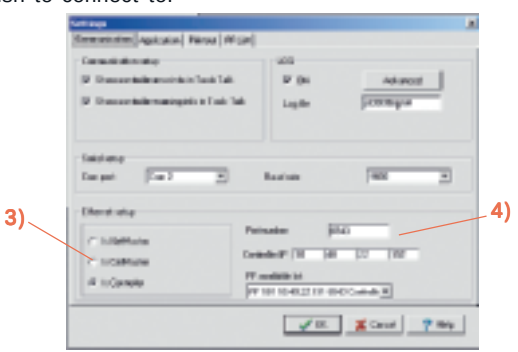
2) Set **IP address** and **Subnet mask** to your own PC under *Start / Settings / Local Area Network connection/ Internet Protocol (TCP/IP) Properties*.



Then in ToolsTalk under *Options/Settings/Communications/ Ethernet set-up*, you can:

3) Select the type of connected Power Focus (Netmaster, Cellmaster or Controller).

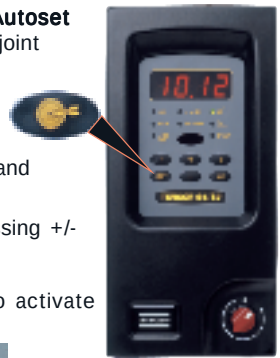
4) Set the Port number and **Controller IP address** of the PF you wish to connect to.



5) You are now ready to connect to the selected PF with a double click in the PF Map or on the connect button.

PSET PROGRAMMING IN PF COMPACT

The PF compact keypad allows an **Autoset** Programming. The PF will recognise joint stiffness and adjust the tool for maximum performance for that particular joint:



1) Press the AUTOSET button once and **ASEt/Ft** appears on the display.
2) Choose final torque target by pressing +/- buttons.
3) Press the ENTER button once to activate the Autoset function.
4) The Graph LED, lights up.
5) Make 5-8 tightenings until the Graph LED lights goes down.

Optimum performance has been found and the system is ready for production.

Changing Final Target value

1) Press the Function button once and **F1/Ft** alternates in the display
2) Press Enter to select the new Final Target value. Change the value by pressing the +/– keys
3) Press Enter to save and exit

Setting Batch count

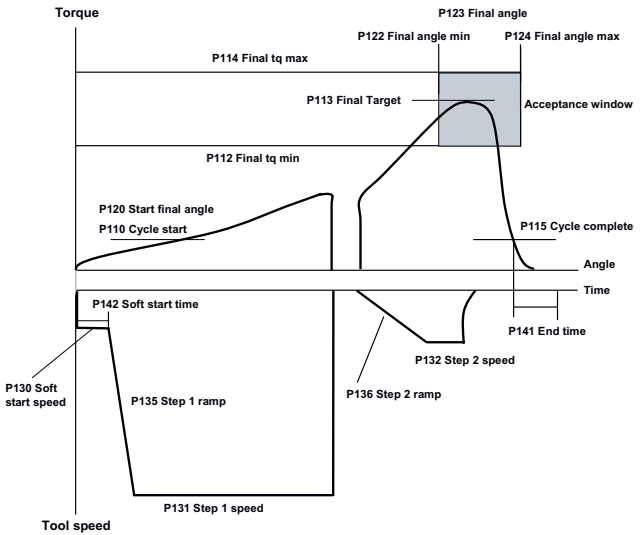
1) Press the Function button five times and **F5/batS** alternates in the display, indicating that a Pset is selected. Otherwise **F5/**---- is displayed.
2) Press Enter to access the Batch Size value.

   Change the Batch Size value by pressing the +/- keys.
3) Press Enter to save and exit.

QUICK REFERENCE GUIDE

This Pset example is a help when programming with the PF Graph or ToolsTalk.

Torque Control / Angle Monitoring
Two Stage Tightening



P1xx Programming
Open new Pset
P13x Speed/Ramp
P130 Soft start speed
P131 Step 1 speed
P132 Step 2 speed
P135 Step 1 ramp
P136 Step 2 ramp
P10x Control Strategy
P100 Tq con/Ang mon
P101 Two stage

P14x Time
P141 End time
P142 Soft start time
P144 Cycle abort timer
P11x Torque
P110 Cycle start
P111 First target
P112 Final tq min
P113 Final target
P114 Final tq max
P115 Cycle complete

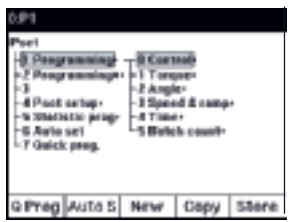
P15x Batch
P150 Batch count
P151 Batch size
P12x Angle
P120 Start final angle
P121 Measure angle to
- Peak tq
- Angle peak
- Cycle complete
P122 Final angle min
P124 Final angle max

PSET PROGRAMMING IN PF GRAPH

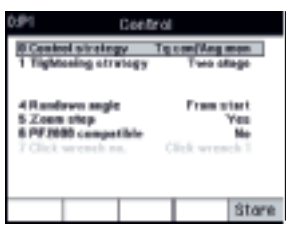
Navigate through the menus with the arrow buttons on the front panel and confirm selections with the Enter button.

1) Press the PROG button and the programming window will appear. Then, *Select Pset – Programming – Control*.

2) Select **Control Strategy**
You can choose between:
- Torque Control
- *Torque Control / Angle Monitoring is defaut prog.*
- Torque Control / Angle Control (Tq con / Ang con [AND]/[OR])
- Angle Control / Torque Monitoring
- Reverse Angle
- Rotate spindle forward/reverse
- Click wrench



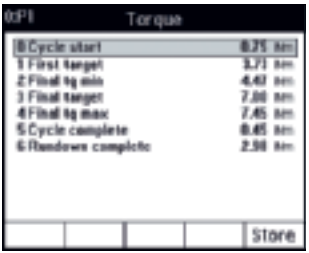
3) Select **Tightening strategies**
You can choose between:
- One stage
- Two stage
- Quick Step
- Ergoramp



Two Stage is default prog. The tool operates at high speed during the first stage and at lower speed during the second stage. The tool stops for about 50 ms between stages to reduce joint relaxation.

PSET PROGRAMMING IN PF GRAPH

4) Go back one level and select **Torque.**
Set the Torque parameters and Store.
Go back one level and select **Angle.**
Set the Angle parameters and Store.

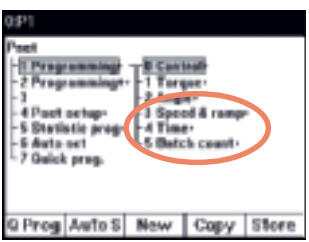


5) Continue the programming by setting in the same manner:

Speed and Ramp
Step 1 Speed is the speed used during the rundown. When *First Target* is reached, the tool slows down to *Step 2 Speed* to tighten the second stage. To finish the tightening the tool goes into *Zoom Step Speed* for operator comfort and minimization of overshoot.

Time
Soft Start time facilitates screw engagement by turning at a very low speed during the soft start time.

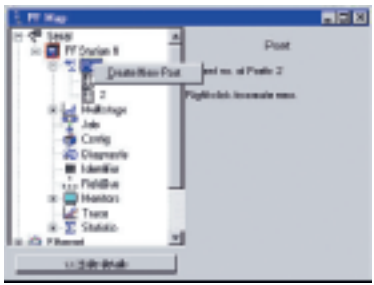
Batch count
Enables you to control the number of tightenings. You can also lock the tool at Batch OK.



6) Press Store to save the Pset.

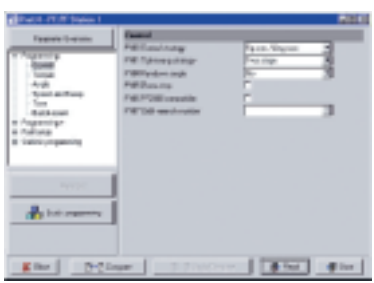
PSET PROGRAMMING IN TOOLSTALK

1) Right click on Pset in PF Map and select create new Pset.



2) The Create New Pset window pops up. Name (optional) the Pset and click OK.

3) The programming window appears. Select the following and click store.
   - Control Strategy
   - Tightening Strategy
   - Rundown angle
   - Zoom step
   - PF 2000 compatible



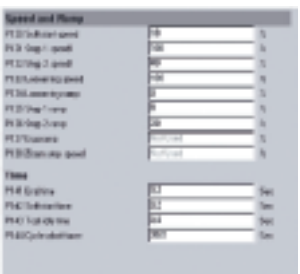
Please refer to the Graph programming for explanation of the different parameters.

PSET PROGRAMMING IN TOOLSTALK

4) Click on **Torque** or **Angle** in the menu tree and set the Torque and Angle parameters.

Hint! Display limits for each parameter by holding the cursor in respective parameter box.

5) Continue the programming by setting **Speed and Ramp**, **Time** and **Batch Count** parameters in the same manner.



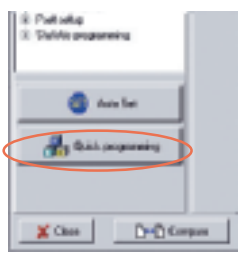
6) Click Store to save the Pset.

QUICK PROGRAMMING

You only need to set the following parameters:

- Control Strategy
- Joint Angle
- Final Target

All other parameters are calculated and set automatically by Power Focus.



CONFIGURATION

The configuration set-up contains the configuration parameters which are unique for each Power Focus unit. It contains four subgroups:

1. **The System set-up** contains basic Power Focus features such as name, language and the appearance of the Power Focus Graph display.

2. **I/O Setup** – Apart from the internal I/O ports it is also possible to connect up to 15 external I/O devices to the Power Focus I/O bus.

3. **Communication** – Ethernet and Serial communication links, ToolsTalk and database applications such as ToolsNet, etc. IP addresses and baud rates etc are set-up in this window.

4. **Protocols** – This window contains the settings for each communication protocol.

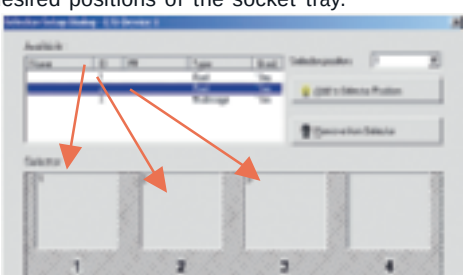
SOCKET SELECTOR SETUP

The selector is an accessory that can guide the operator through a **JOB sequence** with LEDs. When a socket is lifted, the corresponding Pset will be selected. The selector is available in 4 and 8 positions.

Selector 4 positions

1) **Hardware Setup:** Connect the selector via I/O bus to the Power Focus. Make sure that the I/O bus is terminated.
2) **Software Setup:** Go in ToolsTalk under *Configuration* and *I/O Setup* and select *Selector Pset* under appropriate *I/O.* The device number on the hexagonal switch in the back of the socket tray should have the same number as the device number where the tray is set up in ToolsTalk.

3) Click on *Set* and drag the Psets that you have created before in the desired positions of the socket tray.



4) Store. Then go back to *Other I/Os* and set the *Pset select Source* to *Selector.*

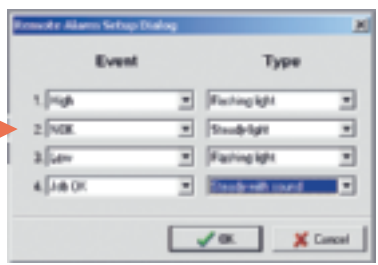
RE-ALARM & I/O EXPANDER SETUP

The **RE-alarm** gives status information to users using lights and/or audible signals. It is connected to the Power Focus on the I/O-bus.

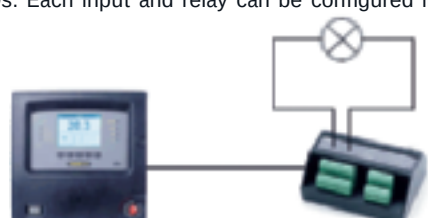
RE-Alarm

Detailed setup: please refer to the Selector as it is very similar. It is possible to configure the information you want to see.

Config. of the 4 alarms



The **I/O Expander** enables the connection of several inputs and relays when more than those built-in are required. There are 8 inputs and 8 relays with the same functionality as the four built-in I/Os. Each input and relay can be configured individually.

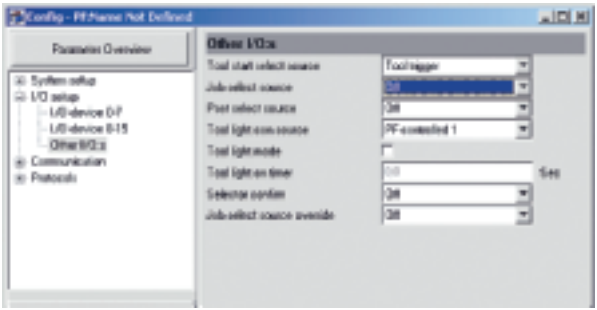


I/O Expander

Detailed setup: please refer to the Selector as it is very similar.

OTHER I/O SETUP

Other inputs and outputs to the Power Focus are set-up in this branch, most notably are the *Tool start select source*, *Job select source* and *Pset select source*.



Tool start select source can be:
- Tool trigger
- Digital Inputs
- Fieldbus
- Sync Start

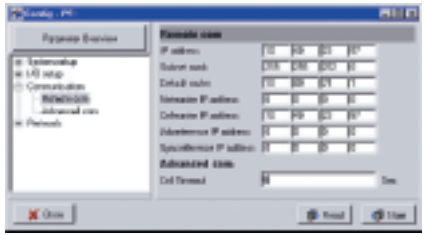
Job select source can be:
- Off
- Digital Inputs
- Ethernet Serial
- Identifier
- Fieldbus
- PF Keyboard

Pset select source:
- Off
- Selector
- Digital Inputs
- Ethernet Serial
- Identifier
- Fieldbus
- PF Keyboard

The "Other I/O Setup" can often be the problem source for trouble shooting if the Power Focus behaves incorrectly.

COMMUNICATION / PROTOCOL

Power Focus communicates by both Ethernet and Serial communication links and can tie in with ToolsTalk and database applications such as ToolsNet, etc. **IP addresses** and baud rates etc are set-up in this window.

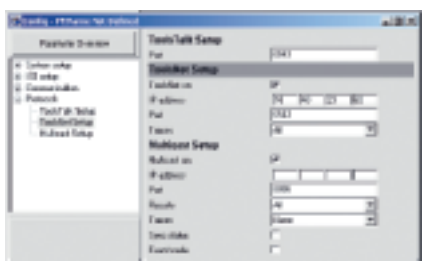


Remote com

The IP address configuration of the Power Focus is set-up in this branch. **This is a prerequisite** if you want to communicate with the Power Focus via Ethernet or set up a cell (see cell programming).

ToolsNet set-up

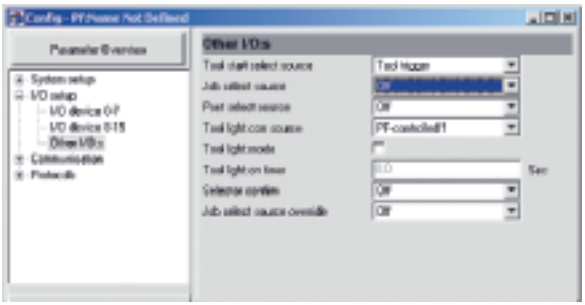
The ToolsNet communication is turned on and configured in this branch. Make sure that the Power Focus is set-up in accordance with IP address and port number of the **ToolsNet server.**



Multicast set-up

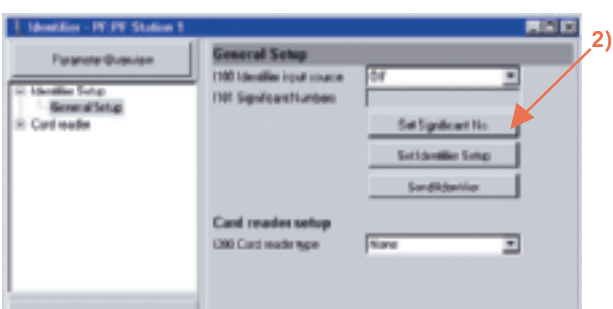
Multicasting of tightening results is turned-on and configured in this branch. The multicasting must be turned on in order for **the Factory Overview Software** to work.

IDENTIFIER SETUP



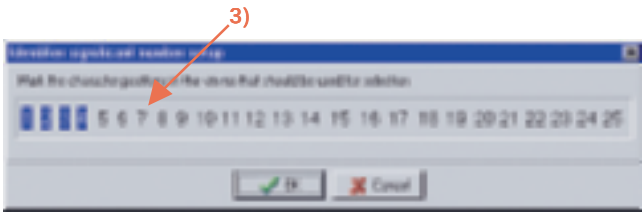
With Power Focus it is possible to use a barcode (typically the VIN Number) to select Jobs or Psets.

1) Start by connecting ToolsTalk and the Identifier (Barcode reader) to the Power Focus.
2) In ToolsTalk click on Identifier in the PF Map.
   Set Identifier input source and click on *Set Significant No.*



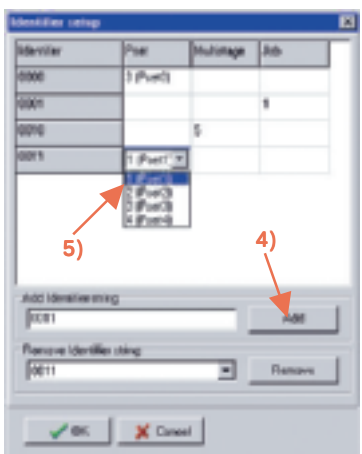
IDENTIFIER SETUP

3) Select the positions where the significant information is located in the barcode. 1 – 10 numbers can be selected (it is not necessary to set them in a row).



4) Click on Set Identifier Setup.
Enter a string in the Add Identifier string field and click Add.

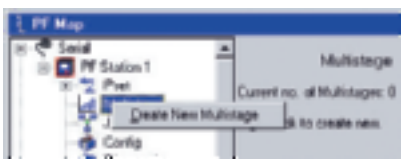
5) Once all strings are entered, associate them with a Pset, Multistage or Job by double clicking in the corresponding cell in the matrix.

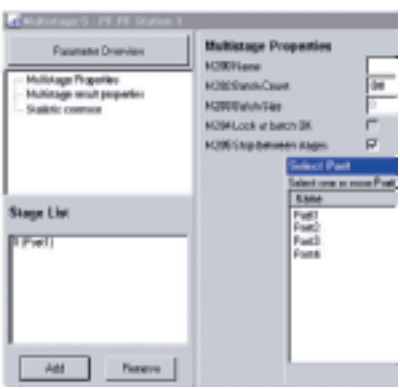


MULTISTAGE PROGRAMMING IN TOOLSTALK

The Multistage feature allows you to dynamically link up to eight (8) parameters in several steps to perform a sequence of operations. It is used for joints with high relaxation.

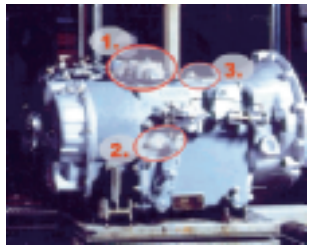
1) Create the different Psets separately.
2) Right click on Multistage in the PF Map and *select Create New Multistage*, choose ID, Name and click OK.
3) Click *Add* to open a window where you can select Psets to be included in the Multistage.
4) Edit the Multistage Properties and Store your programming.





JOB PROGRAMMING

This is a typical application for a Job: an object with bolts that require different torque values and number of tightenings:

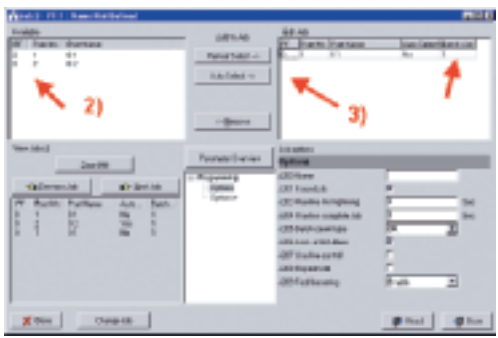


1. Four bolts that require torque X.
2. Three bolts that require torque Y.
3. One bolt that requires torque Z.

You do the programming like this:

1) Right click on **Job** in the PF Map and select Create New.

2) The Job window appears where you will find a list of all the available Psets and Multistages.



3) Select the desired Psets and Multistages and add them to the Edit Job list by clicking either Manual select or Auto select.

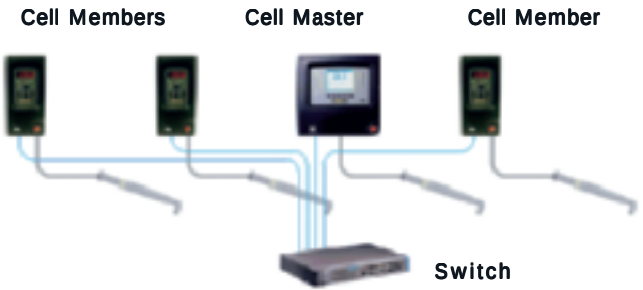
4) Set the batch size.

5) Select and set Job options parameters.

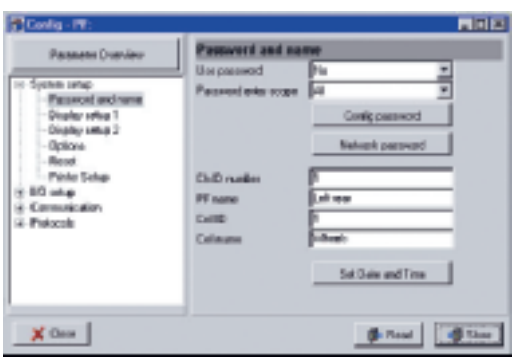
Note! Forced job must be selected if Auto Select is used.

CELL SETUP PROGRAMMING

The Cell and Net concept is part of the **Silver** and the **Gold** software versions. A Cell consists of one Cell Master and a maximum of 19 Cell Members. Here is an example with 3 Cell members.



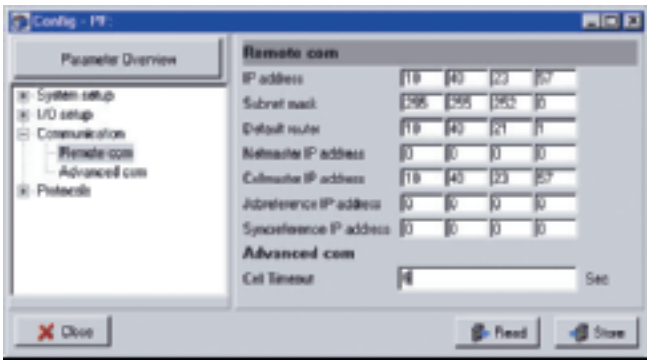
1) Connect the different Cell members with an Ethernet cable via a switch.
2) Configure *Password and Name* for Cell master:
   – Set Channel ID to a unique number within the cell [1-20].
   – Set Cell ID to a unique number within the network.
   Click Store to save the settings.



CELL SETUP PROGRAMMING

3) Complete *Config-Communication* for the Cell master:

- **IP address**, **Subnet mask** and Default router.
- Define a Cell Master by setting Cellmaster IP address equal to the IP address of the same controller.
- Click Store to save the settings.
- **Restart the Power Focus!**



4) Repeat a similar programming for cell members but change the channel ID and set Cell Master IP address in the appropriate field.

Now you are ready among others to program a **Cell Job** where several Power Focus units are involved. Cell Jobs run in the same way as ordinary jobs with a **Job reference** as the main controller.

SYNCHRONISATION PROGRAMMING

With the **Gold RBU** version, you have the possibility to create a Sync Group and synchronise 2 to 10 spindles to perform the same task simultaneously. This is an example with 4 synchronized Power Focus units.

Hardware setup

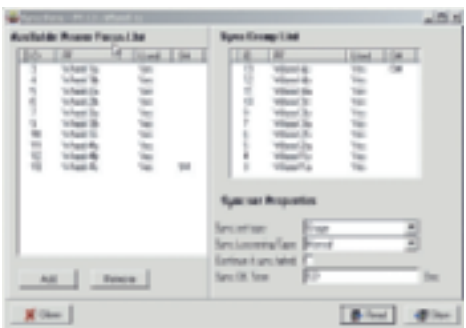
1) Connect all Sync Members and the Sync Reference via the I/O-bus. Do not forget to terminate the I/O bus with terminators.

2) Configure the 4-pin remote start connector on remote start for the sync members and according to the selected start signal input on the Sync Reference.

SYNCHRONISATION PROGRAMMING

Software Setup

1) Make sure that all Power Focus units in the synchronised group are part of the same Cell (see cell programming).
2) Decide which units should act as Sync Reference and Sync Members according to HW setup.
3) For the **Sync members**:
   - Set Sync reference IP address in the appropriate field.
   - Set Tool start select source to Sync start.
   - Configure the 4-pin connector on the back panel for remote start.
   - Re-start the Sync Member.
   - Repeat step 1-4 for all Sync Members.



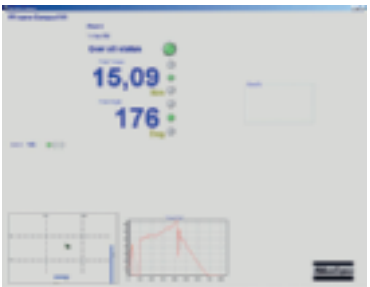
4) For the **Sync reference**:
   - Set Sync reference IP address equal to own IP address.
   - Create the Sync Group List and set other Sync options.
   - Re-start Sync Reference.
   - Pset programming, and I/O-setup is done only on the Sync Reference.

MONITORING IN TOOLSTALK

ToolsTalk provides a number of monitors designed to present extensive information about various functions of Power Focus. Among others are:

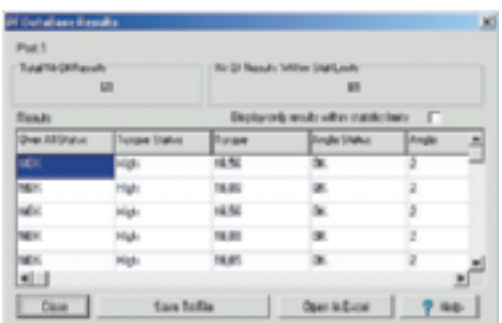
Operator Monitor

Detailed information about the tightening operation is presented.



Get all results

Power Focus can store up to 5000 individual tightening results. With the Get All Results option, the user is able to retrieve and view these.



By choosing *Save To File* the results are saved into a text-file. The user can also choose to open and view the results in Microsoft Excel® by selecting *Open In Excel.*

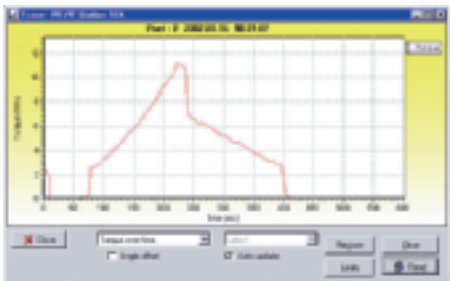
TRACES / STATISTICS

These are three different ways to activate the **traces**:

1) Select Window in Main Row and then click on Activate->Trace.

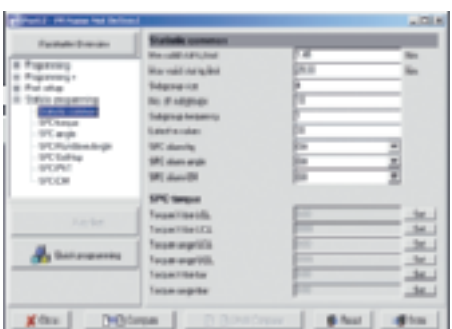
2) Use the PF map. Double-click on Trace.

3) Use Trace icon in Toolbar. Click on the icon.



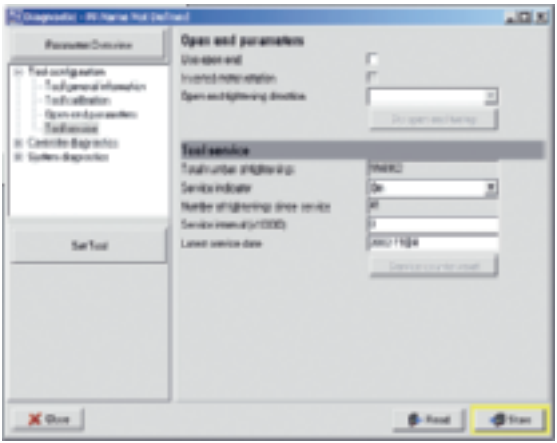
Statistics

The statistic setup can be found under Pset – Statistic Programming. There you are able among others to program statistical alarms like SPC, etc.



SERVICE SETUP

Under Diagnostic – Configuration – Tool service, this window shows the service status of the tool.



Here you can see information about last service date and the number of tightenings after service. By turning the Service indicator alarm On, the Power Focus will automatically alert the user when the service interval has expired.

EVENT CODES

Event code	Group	Description
E000-E099	0	Rundown failures
E100-E199	1	Event-related errors
E200-E299	2	User input error
E300-E399	3	Statistical errors
E400-E499	4	Communication errors
E500-E599	5	Hardware errors TOOL
E600-E699	6	Hardware errors DC3000/MC3000
E700-E799	7	Hardware errors
E800-E899	8	Software errors
E900-E999	9	Errors MMI3000

Event Code	Event Text	Ack-now-ledge	Explanation
E000-E099: Rundown errors			
E001	Torque LO	-	Start button was probably released to early. Let the tool «finish» the tightening.
E002	Torque HI	-	The programming is probably bad. Make sure that you have some movement on the socket in the second stage.
E003	Torque measurement possibly invalid	-	
E004	Angle1 LO	-	Check the programming or the joint
E005	Angle1 HI	-	Check the programming or the joint
E006	Angle2 LO	-	Check the programming or the joint
E007	Angle2 HI	-	Check the programming or the joint
E100-E199: Event-related errors			
E101	Pset invalid (check sum error)	Yes	
E102	Rundown prohibited due to Lock on Reject	-	This error code is displayed after a NOK tightening when the function Lock on Reject is activated. In this case the tool is disabled, the tool can be unlocked with a digital input or with the tool ring.
E103	Forward direction prohibited via digital input	-	The forward direction is prohibited via the digital input.

E104	Reverse direction prohibited	-	The reverse direction is prohibited via digital input or in Job mode. The reverse direction is prohibited in job mode when Lock at Job Done is selected or batch mode is configured to NOK+OK.
E105	Reverse direction prohibited via ToolsTalk	-	The reverse direction is prohibited via Tools Talk.
E106	Rundown prohibited due to active CycleHold	-	The tool is locked due to Cycle hold.
E107	Rundown prohibited due to Line Control, batch not enabled	-	A job using Line Control is selected. The job does not start until Line Control Start signal is received.
E108	Rundown prohibited due to keypad usage	-	
E109	Pset revision not supported by this SW	-	
E110	Configuration revision not supported by this SW	-	
E111	MC Rundown timeout	-	The rundown was not terminated before the drive time out (2 minutes).
E112	Rehit	-	
E113	Current limit reached – Rundown aborted	Yes	The current limit has been reached; the drive is disabled.
E114	OpenEnd Reference position not found	Yes	
E115	Direction uncertain	-	
E116	SelfTap max torque reached – Rundown aborted	-	
E120	MC Motortuning failure	Yes	Motor tuning failed. The trigger could have been released before the end of the motor tuning or the tool has a defect.
E121	OpenEnd tuning failure	Yes	This error indicates that the open end tuning command has not been successfully performed. Either the command was aborted by the operator or the command could not be performed for any other reason.
E126	Multistage aborted	-	This error indicates that the current running multistage has not been performed entirely (the drive has been shut off or the tool trigger was released before the end).

E127	PVT shut off	-	This error indicates that the drive was shut off in the Self-tap or prevail phase of the rundown.
E128	Trigger lost	-	When the function Trigger lost is activated in the Pset, this error indicates that the trigger of the tool was released before final target.
E129	Torque lower than target	-	When the function torque lower than target is activated in the Pset, this error indicates that the torque result is below final target. The torque status is NOK even if the torque result was larger than final torque min.
E130	Post view torque shut off		Post view torque conditions were not fulfilled.
E131	Tool Disconnected	Yes	This error indicates that the tool is not connected to the controller or that the tool cable has been damaged.
E132	Wrong tool start input setting	Yes	1) Check if the remote start wiring in the PF is correctly set in accordance to the settings in the Configuration parameters (C220). 2) Check if the tool trigger is constantly pressed or if there is some malfunction in the tool.
E133	Forward direction prohibited via ToolsTalk	-	The forward direction is prohibited via ToolsTalk.
E134	MC Target input active at start attempt	-	The target signal is active in the drive though the tightening has been acknowledged by the CC-card.
E135	MC No start Ack from CC	-	No start acknowledgement has been received by the MC drive from the CC-card (timeout 32s)
E136	Rundown prohibited due to batch locked	-	This error is displayed if the function lock at batch OK is enabled and when the batch is completed. The tool can only be unlocked via a digital input.
E137	Rundown prohibited via field bus	-	The rundown is prohibited via field bus.
E138	Wrong tool start input source	-	It is only possible to start the tool from the selected tool start select source.
E139	Rundown prohibited via Open protocol	-	The rundown is prohibited via Open protocol.
E140	Insert user ID card to release tool	-	The tool is locked, the user must insert his ID card in the card reader to release the tool.
E141	MC Current Monitoring torque deviation	Yes	

E142	MC SyncroTorque diffstop	-	
E150	Job client does not respond	-	When running a Cell Job, this error is displayed by the job master when one of the job members does not respond.
E151	Job in OFF mode	-	It is not possible to select a new job, the PF3000 is in Job Off mode.
E152	PF locked in job mode	-	This error appears when in a forced cell job an attempt is made to tighten with a controller which is not currently active or when a controller has performed all tightenings.
E153	Not Ok to select new job	-	A job is currently running, it is not possible to select a new job until the first is finished in some way (completed or aborted). This message is also displayed if a job is selected on a job member.
E154	Remote job running	-	When running a Cell Job, this is displayed by the job members when a cell job is selected on the job master.
E155	Remote job aborted	-	When running a Cell Job, This is displayed by the job members when a cell job is aborted.
E156	Job members lost	-	When running a Cell Job, this is displayed by the master when it has lost contact with one of its job member.
E157	Job reference lost	-	When running a Cell Job, this is displayed by the job members when they have lost contact with their Job Master.
E158	Invalid Job ID	-	When the selected job does not exist.
E159	No Pset In Selected Job	-	When the selected job does not contain any Pset.
E160	Job select source not valid	-	Attempt to select a Job with the wrong input source.
E161	Line Control Alert 1	-	The line control has been activated, and the first control alert limit has been reached.
E162	Line Control Alert 2	-	The line control has been activated, and the second control alert limit has been reached.
E180	Euchner Ident System only supports Siemens 3964R protocol	-	The protocol settings for the serial COM port 1 is not set to 3964R, it is not possible to use the Euchner Ident System with this configuration.
E181	Not possible to read ID card	-	It was not possible to read the ID card inserted in the Euchner system.

E200-E299: User input error			
E201	First target > Final target	-	
E202	Final target >Tool max torque	-	
E203	First target < XX % of tool max torque	-	
E204	Final target <YY % of tool max torque	-	
E205	Pset not open	-	
E206	Pset number invalid	-	An attempt was made to do a tightening with the wrong Pset within a job.
E207	Wrong Pset Select Source	-	Attempt to select Pset from a source not specified in the Cset.
E208	Not Ok to select new Pset	-	It is not allowed to select new Pset when the already selected Pset is auto selected by Job.
E233	Final target range error	-	This error code is displayed when an attempt is made to tighten with a final target out of range (larger than tool max torque or 9999).
E234	Start final angle range error	-	This error code is displayed when an attempt is made to tighten with a start final angle out of range.
E235	Target angle range error	-	
E236	Configuration set inconsistent	Yes	This error code is displayed if one device on the IO bus has the right ID but the wrong type (for example a selector is connected and a re-alarm is configured).
E237	Strategy Configuration error	-	No valid control strategy was chosen for the stored Pset.
E238	Not possible to run a multistage with a click wrench Pset	-	An attempt was made to perform a multistage tightening containing at least one Pset with a click wrench strategy.
E240	Password Incorrect Input Source	-	The password is entered from an invalid source according to the configuration.
E241	Password Access Denied	-	
E242	Password Locked Out	-	

E250	Maxtime for first tightening run out (job)	-	This message is displayed and the job is terminated if the first tightening is not performed within the specified time.
E251	Maxtime to complete job run out	-	This message is displayed and the job is terminated if the job is not completed within the specified time.
E300-E399: Statistical errors			
E333	Not allowed subscription	-	The requested statistic subscription is not allowed. For example it is not allowed to set an angle statistic subscription for a Pset using only the torque control strategy.
E334	No statistic available for this Pset	-	The Pset strategy is not suitable to calculate statistics (no strategy is chosen, DS control)
E335	Not enough data	-	No enough data were available to calculate the statistic control limits.
E336	Mem alloc fail	-	It was not possible to allocate enough memory for the statistic subscription.
E340	Xucl tq	-	The last subgroup mean torque value is larger than the upper control limit.
E341	Xlcl tq	-	The last subgroup mean torque value is lower than the lower control limit.
E342	Rucl tq	-	The last subgroup range torque value is larger than the upper control limit.
E343	Rlcl tq	-	The last subgroup range torque value is lower than the lower control limit.
E344	Cp tq	-	The torque Cp is lower than 2.
E345	Cpk tq	-	The torque Cpk is lower than 1,33.
E354	2sigma x tq	-	Trend deviation alarm, the last subgroup torque average is outside Xtq-bar-bar – 2 sigma.
E355	2sigma r tq	-	Trend deviation alarm, the last subgroup torque range average is outside Rtq-bar-bar – 2 sigma.
E360	Xucl ang	-	The last subgroup mean angle value is larger than the upper control limit.
E361	Xlcl ang	-	The last subgroup mean angle value is lower than the lower control limit.

E362	Rucl ang	-	The last subgroup range angle value is larger than the upper control limit.
E363	Rlcl ang	-	The last subgroup range angle value is lower than the lower control limit.
E364	Cp ang	-	The angle Cp is lower than 2.
E365	Cpk ang	-	The angle Cpk is lower than 1,33.
E366	7inc x ang	-	Trend deviation alarm, the subgroup angle mean value has increased 7 times consecutively.
E367	7dec x ang	-	Trend deviation alarm, the subgroup angle mean value has decreased 7 times consecutively.
E368	7inc r ang	-	Trend deviation alarm, the subgroup angle range value has increased 7 times consecutively.
E369	7dec r ang	-	Trend deviation alarm, the subgroup angle mean value has decreased 7 times consecutively.
E370	7above x ang	-	Trend deviation alarm, the subgroup angle mean value has been above the average mean value of the average of the last ten subgroups 7 times consecutively.
E371	7below x ang	-	Trend deviation alarm, the subgroup angle mean value has been below the average mean value of the average of the last ten subgroups 7 times consecutively.
E372	7above r ang	-	Trend deviation alarm, the subgroup angle range value has been above the average range value of the average of the last ten subgroups 7 times consecutively.
E373	7below r ang	-	Trend deviation alarm, the subgroup angle range value has been below the average range value of the average of the last ten subgroups 7 times consecutively.
E374	2sigma x ang	-	Trend deviation alarm, the last subgroup angle average is outside Xang-bar-bar – 2 sigma.
E375	2sigma r ang	-	Trend deviation alarm, the last subgroup angle range average is outside Rang-bar-bar – 2 sigma.

E400-E499: Communication errors			
E401	Duplicate device IDs on IO bus	Yes	Two IO devices with the same ID are present on the I/O bus.
E402	IO bus restarted	Yes	The IO bus has been restarted.
E403	IO device not responding	Yes	The I/O device is not properly connected or the ID of the device is not the same as the one configured.
E404	Selector is not connected or not responding	Yes	The selector is not properly connected or the ID of the selector is not the same as the one configured.
E405	IO Expander is not connected or not responding	Yes	The I/O expander is not properly connected or the ID of the I/O expander is not the same as the one configured.
E406	RE-alarm is not connected or not responding	Yes	The Remote alarm is not properly connected or the ID of the Remote alarm is not the same as the one configured.
E408	Multiple devices of same type on IO bus	-	
E409	Multiple selectors on IO bus	-	
E410	No selector found and Pset source is IO bus	-	
E411	Rotary selector has ID <> 1	-	
E412	IO expander has ID <> 2	-	
E413	RE Alarm has ID <> 3	-	
E414	Remote display has ID <> 4	-	
E415	4socket selector has ID <> 5	-	
E416	8socket selector has ID <> 6	-	
E433	No RBU present	Yes	No RBU detected at start-up or RBU found missing at runtime.
E434	RBU Timeout	Yes	RBU did not respond to command from PF.
E438	RBU file mismatch	Yes	A file with incorrect name or size was returned to a read request.
E439	RBU signal mismatch	Yes	An unexpected signal received by the RBU Manager in Idle status.
E440	RBU no files	Yes	

E441	RBU no answer	Yes	
E442	RBU no such file	Yes	
E443	RBU full	Yes	
E444	RBU packet rejected	Yes	RBU responds with an answer not matching the last request. This is probably due to duplicates sent when the PF does not acknowledge packages.
E445	RBU corrupt	Yes	
E446	RBU read error	Yes	
E447	RBU write error	Yes	
E448	RBU delete error	Yes	
E449	RBU flush error	Yes	RBU Erase failed.
E450	RBU list error	Yes	
E451	RBU Update Failed	Yes	One of the database processes failed to synchronise the NVRAM with the RBU.
E460	FieldBus Type Mailbox Message Fault	-	
E461	FieldBus Type Gen Com Fault	-	
E462	FieldBus Mailbox Message Fault	-	
E463	FieldBus Gen Com Fault	-	
E464	FieldBus Hardware Fault	Yes	The FieldBus module is broken and has to be replaced.
E465	FieldBus Dip switch Error	-	The software tries to configure the value of node address or baudrate, But the address switch on the FieldBus module is not in the right position to enable software setting. Set switches in the right position, then turn on the power.
E466	FieldBus Offline	-	The FieldBus went from Online to Offline. This is just a warning.
E467	FieldBus Configuration Fault	-	
E468	FieldBus Hardware Mismatch	-	The FieldBus module installed in PF 3000 is not the same FieldBus type as configured with TTPF. Change FieldBus module or configuration to get a match.
E469	FieldBus Init Error	-	
E470	FieldBus PCP error	-	

E480	Channel ID not valid	Yes	The channel ID configured is not within the limits permitted. The channel ID must configured between 1 and 20.
E481	Cell member registration failed	Yes	The cell member registration failed because one cell member is already registered with the same channel ID.
E490	Cell ID not valid	Yes	The cell ID configured is not within the limits permitted. The cell ID must configured between 1 and 999.
E491	Net member registration failed	-	The net member registration failed because one net member is already registered with the same cell ID.
E492	Software version not compatible with net-cell	Yes	It is not possible to build a net with two different revisions of the software.
E500-E599: Hardware errors TOOL			
E501	Tool overheated	-	The tool is too hot. The drive is disabled.
E502	Tool service interval expired	-	
E511	Tool-PF3000 size mismatch	Yes	Mismatch between the tool and the controller (for example S4/S7 tool connected to a S9 controller).
E512	Tool revision not supported by this drive SW	Yes	The tool is not supported by the drive (drive version too old).
E513	Tool EEPROM corrupt – service tool	Yes	
E514	Tool EEPROM corrupt – Motortune	Yes	
E515	Tool commutation sensor error	Yes	Commutation sensor failure.
E516	Rotor magnet remains out of range	Yes	Rotor magnet remains out of range.
E517	Tool maxtorque or Gear Ratio out of range	Yes	
E518	Tool normalisation out of range	-	
E534	Illegal data error (Current monitoring)	Yes	

E535	Torque transducer error	Yes	Cables to transducer cut off or shorted.
E536	No transducer (sensor)	Yes	Cables to transducer cut off or shorted.
E537	Calibration not OK, offset outside limits	Yes	Calibration limits out of bounds.
E538	Calibration not OK, CalVal outside limits	Yes	Calibration value outside limits.
E539	Calibration not OK, Offset changed > 5% of max value since last calibration	-	Calibration not OK, Offset changed > 5% of max value since last calibration.
E540	Calibration not OK, CalVal changed > 5% of max value since last calibration	-	Calibration not OK, calibration value changed > 5% of max value since last calibration.
E541	Other calibration error	Yes	
E600-E699: Hardware errors DC3000/MC3000			
E601	Dcbus LO at start of rundown	Yes	DC voltage too low
E602	Dcbus HI during rundown	Yes	DC voltage too high
E603	DC3000 overheated	-	The drive is too hot, drive disabled
E604	24V output error	Yes	24 V output disabled (overload or short circuit)
E605	Dcbus HI at start of rundown	-	
E611	DC3000 EEPROM corrupt (csum error)	Yes	
E612	MC3000 EEPROM corrupt (csum error)	Yes	
E613	Config1 EEPROM corrupt (csum error)	Yes	
E614	FirmWare corrupt (csum error etc)	Yes	Firmware corrupt (check sum error)
E615	Option definition HW/ SW mismatch	Yes	
E616	Current measurement offset error	Yes	

E617	Current measurement gain error	Yes	
E633	SW mismatch CC <-> MC: Too old MC SW	Yes	
E634	SW mismatch CC <-> MC: Too old CC SW	Yes	
E700-E799: Hardware errors			
E700	PF started	-	This error code is only visible in the error log and used when the PF3000 is started.
E800-E899: Software errors			
E801	Database incompatible with PF software	Yes	
E802	NVRAM range check error	Yes	
E803	NVRAM size check error	Yes	
E804	Database is corrupt	Yes	
E805	(PF Model unknown)	Yes	This error is displayed after start-up when the RBU is missing, or when the RBU revision cannot be supported by the controller (e.g bronze RBU on a graph unit), or when the RBU license file is missing or cannot be read by the boot code.
E806	Failed to read from NVRAM	-	
E807	Failed to write to NVRAM	-	
E811	DPRAM range check error	Yes	
E821	No calibration ACC from control	Yes	Tightening initialisation phase failed. Hardware failure.
E822	No Job ACC from control	Yes	Tightening initialisation phase failed. Hardware failure.
E823	No calibration result	Yes	No calibration was received from the drive during the tightening initialisation phase (timeout 100 ms).
E824	Cycle abort timeout	-	No tightening result was received from the drive before the Cycle abort timeout. The Cycle Abort timer is configurable in the Pset.
E831	Autoset wrong angle	-	Auto set could not be executed, the angle results of the tightening performed were null.

E832	Autoset small angle	-	Auto set could not be executed, the angle results of the tightening performed were too small (lower than 15 degrees).
E833	Autoset tight NOK result	-	The Auto set could not be executed, four NOK tightenings were performed.
E834	Autoset rejected Pset in CCW direction	-	The Auto set was not allowed by the PF3000 for this Pset because the Pset was configured in the CCW direction. Auto set is only permitted on CW Pset.
E840	Feature Not Available In Software Revision		This error is displayed if when attempt is made to run multistage with a bronze version, or handle a Pset with a Pset ID larger than the max number of Pset (larger than 64 in a bronze version or larger than 250 in a silver or gold version).
E851	Connection with Tools Net server lost	-	The connection with the Tools Net server was lost, the PF3000 is trying to reconnect. The Tools Net server might be down or it might be an Ethernet cable problem.
E855	Connection fatal error		
E856	Router unreachable		The router programmed in the configuration setting could not be reached. Check the network configuration and in particularly the sub net mask and the default router.
E857	Reboot needed before changes take effect		The configuration changes will not take effect before a system reboot.
E858	IP address already in use	Yes	The IP address of this PF3000 is already in use by another system.
E859	IP address collision	-	Another system attempts to use the same IP address as this PF3000.
E860	Memory Allocation Error	-	It was not possible to allocate enough memory to allow the Tools Net process to set a result subscription.
E862	Ethernet overload Error		The Ethernet driver of the PF3000 is switched off due to an overloaded network.
E863	IP Port already in use	Yes	An attempt was made to bind a TCP or UDP socket to a port already in use. For instance, a customer protocol might be using the same port as ToolsTalk.

E864	Ethernet echo detected	-	An Ethernet packet was discarded, since it's source MAC address was equal to the PF's own MAC address. Notice that this message only occur once during runtime, even if several such packets are detected. There is most likely a problem in the network.
E870	Syncmember registration failure	-	The sync member registration failed. Two sync members can have the same channel ID or one PF3000 with a sync reference IP address is missing in the sync list.
E871	Syncmaster configuration failure	-	The master channel ID is not first in the sync list.
E872	Sync initialisation failure		The tightening synchronisation initialisation failed. Check the CAN bus cable, check that all the sync members have the same active port, check the external start bridge
E873	Syndinclock not yet implemented	-	
E891	Precondition Failed	-	
E892	Postcondition Failed	-	
E893	Check violation	-	
E894	Software Warning	-	
E900-E999: Errors MMI3000			
E901	MMI Start up Error	Yes	
E902	Printer start-up error	Yes	
E903	Incorrect toolstalk version	-	The tools talk version is not compatible with the current Power Focus software.

This quick guide is based on PF 3000 E3 Manual

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